ROOF BATTEN

CROSS-REFERENCES TO RELATED APPLICATIONS

This application claims priority under 35 U.S.C. §119(e) to, and hereby incorporates by reference, U.S. Provisional Application No. 60/112,597, filed Dec. 17, 1998.

FIELD OF THE INVENTION

This invention relates to roof coverings and, in particular, this invention relates to building materials or devices which extend the lives of tile roofs by preventing water infiltration.

BACKGROUND OF THE INVENTION

Most tile roofs include an exterior decking or sheathing, which overlays a structural framework of either trusses or rafters. Typically, decking includes plywood sheets or other planking members. One or more layers of overlayment, such as felt (tar) paper, is usually attached to the decking. Battens are normally placed over the felt paper before tiles are installed. The battens are usually fixed to the roof by fasteners, such as nails or staples, driven through the battens and felt paper and into the roof decking. Battens are typically wood strips and serve to separate the tiles from the overlayment. Separation between tiles and overlayment is necessary to ensure that water infiltrating the tiles onto the felt paper evaporates quickly. If water is otherwise allowed to stand or pool, the water may infiltrate through the felt paper and penetrate the roof decking, thereby potentially causing deterioration of the roof decking and the underlying framework. When horizontal batting is installed, water which has infiltrated the roof tiles tends to pool on the upper-slope sides of the battens, thereby potentially causing roof deterioration.

Means previously used to avert or diminish the likelihood of deterioration to tile roofs due to water pooling and infiltration include leaving gaps between adjacent battens and cutting drainage channels on the undersides of the battens. These means have been largely ineffective and have often added to the expense and time necessary for tile roof installation as well.

As depicted in FIG. **1**, roof **20** has installed thereon counter batten system **22** of the prior art. Counter batten system **22** includes vertical battens **24** overlaid with horizontal riser strips **26**. Typically, vertical battens **24** are ⅜ by 1½ inch wooden boards, often four feet in length. Vertical battens **24** are typically installed every 16 inches, on center. Horizontal riser strips **26** are typically wooden lathes and are installed atop vertical battens **24** at spacings determined by the dimensions of the tiles to be installed. While counter batten system **22** is somewhat effective in eliminating pooled water, the expense and time required to install counter batten system **22** is often prohibitive.

There is then a need for a device or roofing material which spaces tiles from underlaying roofing and structural members, which greatly reduces or eliminates water pooling when water infiltrates the roof tile system, and which may be installed quickly and efficiently.

SUMMARY OF THE INVENTION

This invention substantially meets the aforementioned needs. There is provided a spacer operatively disposable between a roof decking and an exterior roofing material. The spacer may include at least one layer of a material, the material defining a multiplicity of passages therethrough.

The passages defined may extend generally transversely to a longitudinal axis of the spacer and may allow infiltrated liquids to drain therethrough, thereby preventing accumulation of the infiltrated liquids. The spacer may further include a generally planar first ply and a convoluted second ply cooperating to define the multiplicity of passages. A plurality of first plies and a generally convoluted second ply may be present. The second ply may include a multiplicity of cross-plies extending between the first plies. The spacer may include a plurality of layers. Each adjacent layer of the spacer may be hingably connected. The layers, when assembled in a stacked relationship, may be fastened together by stitching, staples, glue, hot air welding, ultrasonic welding, infrared bonding, other methods known to the art, or any combination thereof.

There is also provided a tile roof system, the tile roof system including an overlayment, a tile, and a batten. The batten may be disposable between the tile and the overlayment and may include at least one layer of a material defining a multiplicity of passages therethrough, the passages extending generally transversely to a longitudinal axis of the batten and allowing infiltrated liquids to drain therethrough.

There is further provided a method of installing a tile on a roof with a slope. The method may include the step of providing first and second battens, each batten comprising at least one layer of a material defining a multiplicity of air passages therethrough. The defined passages may extend generally transversely to a longitudinal axes of the batten and may allow infiltrated liquids to drain therethrough. The method may further include the step of fixing the first and second battens on the roof such that longitudinal axis of the first and second battens are generally parallel and extend generally horizontally to the roof's slope. The method may further include the step of fixing the tile atop the first and second battens.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a roof of the prior art with a counter-batten system installed thereon;

FIG. **2** is a perspective view of one embodiment of the batten of this invention;

FIG. **3** is an end view of the batten of FIG. **2**;

FIG. **4** is a fragmentary, cross-sectional view of a first embodiment of two layers of the batten of FIG. **2**;

FIG. **5** is a fragmentary, cross-sectional view of a second embodiment of one layer of the batten of FIG. **2**;

FIG. **6** is a fragmentary, cross-sectional view of a third embodiment of four layers of the batten of FIG. **2**;

FIG. **7** is a plan view of a sheet of convoluted material suitable for forming the batten of FIG. **2**;

FIG. **8** is a side plan view of the sheet of FIG. **7** being foldably assembled into the batten of FIG. **2** after layers have been defined therein;

FIG. **9** is a perspective view of an exemplary roof upon which battens of FIG. **2** has been installed; and

FIG. **10** is a plan view of tiles installed atop the batten of FIG. **2** on the roof of FIG. **9**.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring to FIGS. **2** and **3**, exemplary batten (spacer) **30** is depicted. Batten **30** generally includes one or more layers **34** and may be characterized by longitudinal axis **36**. Layers **34** are described below and generally serve two functions.

The first function is to allow water to drain therethrough. The second is to enable air exchange. These complimentary functions prevent water pooling and promote drying on roofs on which batten **30** is installed. While one or more layers **34** are contemplated to be within the scope of this invention, if a plurality of layers **34** are present, these layers may be stacked and fixed to each other by such means as stitching **38**. However, other fastening means which may be used include hot air welding (or other fastening means using thermal energy), ultrasonic welding, infrared bonding, staples, glue, or other methods known to the art.

One embodiment of two layers of layer **34** is depicted in FIG. **4** generally as layers **50**. Each layer **50** includes planar plies **52** and **54** and convoluted ply **56**. Convoluted ply **56** is disposed between and bonded to (or otherwise cooperates with) planar plies **52** and **54** to define a multiplicity of air channels **58** therebetween.

Another embodiment of layer **34** is depicted in FIG. **5** generally as layer **60**. Layer **60** includes planar plies **52** and **54** and second ply **62**. Second ply **62** includes a multiplicity of cross-plies **64**. Cross-plies **64** extend generally perpendicular (or otherwise transversely) between planar plies **52** and **54**. Thus, planar plies **52** and **54** and second ply **62** cooperate to define a multiplicity of channels **58** therebetween.

Referring to FIG. **6**, yet another embodiment of layers **34** is depicted generally as four layers **70**. Each layer **70** includes planar ply **52** and convoluted ply **56**. Planar and convoluted plies **52** and **56** are bonded to (or otherwise cooperate with) each other to define a multiplicity of channels **58** therebetween. Layers **70** may be stacked such that convoluted plies **56** abut, thereby defining another multiplicity of channels **58** therebetween.

These embodiments of layers **34** include a corrugated plastic (resin) material with a nominal weight appropriate for the structure, and often between a range of about 140 and 160 pounds per thousand square feet. One nominal weight may be about 150 pounds per thousand square feet. The plastic resin may have a 4.0 to 4.5-millimeter profile. The plastic resin may further include an about 4.0 (±0.2) millimeter profile. The plastic material may still further be black and include ultraviolet (UV) inhibitors to enable the plastic resin to withstand extended exposure to direct UV light. The plastic resin may include a high-density, polyethylene, corrugated, plastic resin with a brittleness temperature of about −103.0 degrees F., a deflection temperature of about +162.0 degrees F. at 66 pounds per square inch, a bum rate of about 2.5 inches per minute, a self-ignition temperature of about 734.0 degrees F., and may also merit a label of "excellence" for smoke density of a 9.3 percent average.

Referring to FIGS. **7** and **8**, exemplary sheet **80** may be formed of the materials discussed with respect to FIG. **4** and further described above. Thus, sheet **80** includes a multiplicity of channels **58** defined by a cooperation of members such as planar plies **52** and **54** and convoluted ply **56**. Sheet **80** displays first and second surfaces **82** and **84**. Exemplary layers **34** may be formed from sheet **80** by the slit-scoring technique or by the nick-scoring technique, each technique being more fully described below. Alternatively, layers **34** may be formed by completely severing sheet **80** generally along lines **86**. Separate layers **34** are then stacked and fixed as described above.

The slit-scoring technique is described in U.S. Pat. No. 4,803,813, issued to Fitterman on Feb. 14, 1989, the entire contents of which are hereby incorporated by reference. In the slit-scoring technique, hingelines **88** alternate with hingelines **90**. Hingelines **88** are defined by extending a slit generally along a line **86** and parallel (or generally transversely) to channels **58**. The slit extends through planar ply **54** and convoluted ply **56**, thereby leaving planar ply **52** intact. Hingelines **90** are defined by extending a slit generally along a line **86** and generally parallel to hingelines **88**. The slit extends through planar ply **52** and convoluted ply **56**, thereby leaving planar ply **54** intact. Intact planar plies **52** and **54** are thus used as hinges and batten **30** is assembled by Z-folding layers **34** along hingelines **88** and **90** in the manner depicted in FIG. **8**.

The nick-scoring technique is an alternative hinge-forming technique described in U.S. Pat. No. 5,094,041, issued to Kasner et al., on Mar. 10, 1992, the entire contents of which are hereby incorporated by reference. In the nick-scoring technique, lines **86** include a series of generally linear perforations. Each perforation substantially extends through planar plies **52** and **54** and convoluted ply **56**. Substantially intact portions of planar plies **52** and **54** and convoluted ply **56** remain between perforations. Lines **86** are thusly formed into hinges and thereby define layers **34**. Layers **34** may be Z-folded along lines **86** in a manner substantially resembling FIG. **8** to assemble batten **30**.

Still another hinge-forming technique includes forming completely separated layers **34** and hingably connecting adjacent layers **34** with a pliable adhesive member such as tape.

Channels **58** extend generally perpendicularly, or otherwise transversely, to longitudinal axis **36** of batten **30**. As more fully described below, batten **30** is installed in generally horizontal rows on a roof. Channels **58** therefore allow water to drain therethrough, preventing water pooling and enabling air exchange once tiles, or other similar materials, are installed.

As depicted in FIG. **9**, roof **100** includes overlayment **102** installed over a decking member as described above. Battens **30** are fixed to roof **100** in generally parallel rows **104**. Rows **104** extend substantially horizontally with respect to the slope of roof **100**. The distance between rows **104** is determined by the dimensions of the tiles or other materials to be installed. As depicted in FIG. **10**, exterior roofing members such as tiles **110**, are installed atop battens **30**. Thusly installed on a roof, battens **30** function to space tile **110** from the remainder of roof **100** and to drain water which has infiltrated between installed tiles **110**, thereby preventing the infiltrated water from pooling atop overlayment **102** and preventing the water from penetrating into the decking and structural members of roof **100**. Also as installed on roof **100**, channels **58** of battens **30** serve as conduits for air exchange beneath tiles **110**, thereby further promoting evaporation of infiltrating water.

Exemplary roof batten **30** may be about ⅝ inches in thickness, 1½ inches in width, and include two hinged segments 48 inches in length. However, many other dimensions are contemplated to be within the scope of this invention. Exemplary roof batten **30** may be utilized with clay or cement tiles, including flat tiles, S-tiles, and barrel tiles. Moreover, while exemplary roof batten **30** is depicted as being used in conjunction with roof tiles, other exterior roof materials including slate, clay, metal, and cedar may also be installed using exemplary roof batten **30**.

Batten **30** of this invention thereby promotes ventilation and prevents water accumulation beneath tiles or similar exterior roofing members. The result of installing the batten of this invention is thusly a roof, which remains drier and is more protected from decomposition and damage than if